

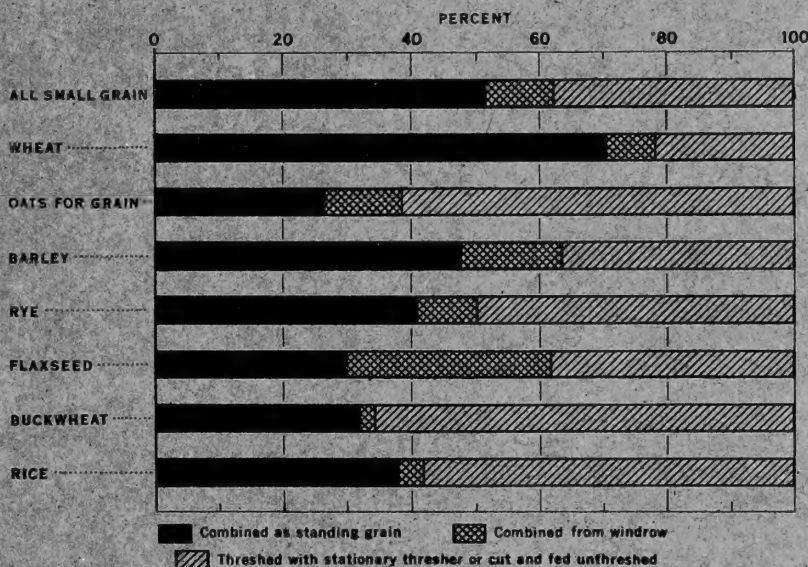
Historic, archived document

Do not assume content reflects current
scientific knowledge, policies, or practices.

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ECONOMICS

HARVESTING SMALL GRAINS AND UTILIZATION OF THE STRAW

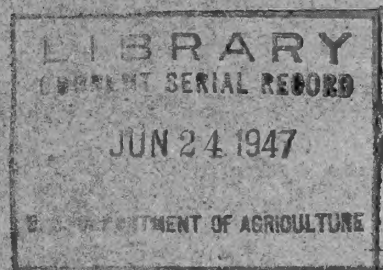
SMALL GRAINS: ACREAGE HARVESTED BY SPECIFIED METHODS,
UNITED STATES, 1945



U. S. DEPARTMENT OF AGRICULTURE

NEG. 44319 BUREAU OF AGRICULTURAL ECONOMICS

WASHINGTON, D. C.
JUNE 1947



Source of Material

The basic information of this report was furnished by the voluntary crop reporters of the United States Department of Agriculture in February 1946. Farmers from all parts of the United States reported on the methods of harvesting wheat, oats, barley, rye, flax, and buckwheat, and on the utilization of the straw. The reports are judgment estimates of the proportion of the acreage of each crop, in the locality, harvested by specified methods and the percentage of the straw utilized in various ways.

About 13,000 reports were obtained concerning the harvesting methods used with oats and the utilization of its straw. All States were covered in the oat study.

About 11,700 reports were obtained concerning the practices used in harvesting wheat and utilization of wheat straw. All States harvesting more than 1,000 acres of wheat were covered in the study except Wisconsin and Maine. More than 99 percent of the harvested wheat acreage and production in 1945 was in the reporting States.

Information concerning barley harvesting practices and the utilization of its straw was obtained from about 6,000 crop correspondents in 38 States, which contributed about 98 percent of the 1945 harvested barley acreage and production.

For flaxseed, about 900 reports were received from correspondents in 6 States which in 1945 had about 85 percent of the harvested acreage and about 90 percent of the production.

For rye, about 1,200 reports were supplied by crop correspondents from 5 States with about 50 percent of the 1945 harvested rye acreage and about 55 percent of the 1945 production.

For buckwheat, reports were received from about 300 crop correspondents in New York, and Michigan, which had about 30 percent of the 1945 United States acreage and production.

This report also contains estimates of grain harvesting methods and straw utilization for States not covered by reports from crop correspondents. In most instances the estimates are for States where small acreages of the crop were grown. These estimates were developed largely from reports supplied by crop correspondents in adjacent or nearby States. It was assumed that the method of harvest and the utilization of straw of a specific small-grain crop in a non-reporting State would show about the same relationship to harvesting practices and straw utilization of another small-grain crop reported in that State as was indicated in an adjoining or nearby State which reported on both of those crops.

The information concerning harvesting methods for rice and utilization of the straw was obtained mostly from rice specialists and others familiar with practices in the various rice States. The inclusion of these estimates permits a fairly close appraisal of the harvest methods and straw utilization of all small-grain crops.

This report contains estimates of harvesting practices for the 1938 wheat and oat crops based chiefly on material supplied by crop correspondents in February 1939, and estimates of custom harvest rates based on information supplied by crop correspondents for the 1938 and 1945 small-grain crops.

The data for harvesting wheat and oats in 1938 are included in order to provide a direct measure of the changes in harvesting practices for wheat and oats and the changes in custom harvest rates that occurred from 1938 to 1945.

HARVESTING SMALL GRAINS AND UTILIZATION OF THE STRAW

By A. P. Brodell, Agricultural Economist, J. W. Birkhead, Agricultural Economist, and J. H. Peters, Agricultural Statistician

CONTENTS

	<u>Page</u>
Introduction	1
Harvesting small grains	2
Wheat	2
Oats for grain	8
Barley	11
Rye	11
Flaxseed	14
Buckwheat	15
Rice	16
Custom harvest rates	17
Utilization of straw	20
Wheat straw	23
Oat straw	23
Barley straw	27
Rye straw	27
Flaxseed straw	30
Buckwheat straw	31
Rice straw	32

INTRODUCTION

The harvested area of all small-grain crops in 1945 was about 125 million acres. This was about 11 percent above the 1935-44 average and was exceeded only by the harvested acreage of 1919. With relatively favorable growing conditions, per acre yields of the major small grains in 1945 were above average. Abandonment of seeded acreage was low, and this accounted in part for the large harvested acreage. With average abandonment the harvested acreage in 1945 would have been only 4 percent above average.

The harvested acreage of all small-grain crops in 1945 amounted to about 35 percent of the acreage of all harvested crops, and exceeded the harvested acreage of corn, the leading crop, by more than 40 percent.

Labor used per acre for growing and harvesting small-grain crops is materially below the average for all crops. This is mainly because

the small-grain crops are extensively grown on relatively large farms in the more level areas where large power units and machines are used. Production of wheat, the leading small-grain crop, has long been mechanized more than any other major crop. Even so, it has been further mechanized within recent years and there has been a marked increase in mechanization in both growing and harvesting other small grains of late when farmers had bountiful grain crops.

The farm labor force was depleted during the war with a relatively high proportion being children, women, and elderly male workers. Wage rates were much higher, compared with prewar rates, than was the cost of doing work by machine methods. These have hastened the use of labor-saving machines of all types, especially those used during the busy harvest season. Farmers' cash incomes have been much higher than before the war so they could buy new machines and adopt new methods.

HARVESTING SMALL GRAINS

Combining is now the most important method of harvesting small grains. About 125 million acres of small grains were harvested in 1945 of which about 62 percent was combined (table 1). About 52 percent of the total acreage was combined as standing grain and about 10 percent was combined from the windrow. Windrow combining accounted for more than 20 percent of the harvested small-grain acreage in North Dakota, South Dakota, Iowa, and Minnesota and is relatively important in Illinois. About 90 percent of the total acreage of small grains was combined as standing grain or from the windrow in California, Washington, Oregon, and Kansas. Combines harvested approximately 27 percent of the small-grain acreage in the Lake States but in the Great Plains States where small grain production is important about two-thirds of the acreage was combined.

About 38 percent of the 1945 acreage of small grains was threshed with stationary threshers or cut and fed unthreshed. About 75 percent of the small grain in the Lake States and two-thirds of that in the Appalachian and Northeastern States was so handled.

Wheat

The 1945 harvested wheat crop of about 65.1 million acres was exceeded in 1919, 1938 and 1946. The 1945 production of about 1.1 billion bushels was only slightly below the record crop of 1946. The 1945 yield per harvested acre of 17.0 bushels has been exceeded only in 1942, 1944, and 1946.

Table 1.- Percentage of small-grain crops harvested by specified methods 1/

State	Total acres harvested			Percentage of 1945 acreage that was:		
	1935-39 average	1940-44 average	1945	Combined		
				As standing grain	From windrow	Threshed with stationary thresher or cut and fed unthreshed
	1,000 acres	1,000 acres	1,000 acres	Percent	Percent	Percent
New England	209	182	151	22.3	.1	77.6
New York	1,418	1,355	1,219	38.5	.2	61.3
New Jersey	128	158	126	83.4	.1	16.5
Pennsylvania	2,163	2,005	1,990	32.7	.2	67.1
Delaware	89	84	101	63.7	.1	36.2
Maryland	526	468	494	33.5	--	66.5
Northeast	4,533	4,252	4,081	36.5	.2	63.3
Ohio	3,498	3,142	3,358	64.3	1.0	34.7
Indiana	3,332	2,762	3,060	67.4	3.2	29.4
Illinois	5,959	4,882	4,806	55.2	15.8	29.0
Iowa	6,880	5,699	5,559	18.7	22.1	59.2
Missouri	4,211	3,394	2,931	39.4	2.1	58.5
Corn Belt	23,880	19,879	19,714	46.0	11.0	43.0
Michigan	2,526	2,409	2,693	54.5	1.6	43.9
Wisconsin	3,700	3,130	3,258	13.1	1.1	85.8
Minnesota	9,420	8,677	8,158	2.2	20.4	77.4
Lake States	15,646	14,216	14,109	14.7	12.3	73.0
North Dakota	10,681	14,306	16,439	24.4	36.5	39.1
South Dakota	6,029	7,974	8,732	13.6	29.5	56.9
Nebraska	6,461	6,465	7,008	52.1	3.5	44.4
Kansas	12,911	13,576	14,970	91.8	.6	7.6
Great Plains	36,082	42,321	47,149	47.9	18.9	33.2
West Virginia	256	197	180	3.2	--	96.8
Kentucky	579	568	556	37.1	--	62.9
Tennessee	619	643	750	36.7	--	63.3
Appalachian	1,454	1,408	1,486	32.8	--	67.2
Virginia	800	751	742	25.7	--	74.3
North Carolina	797	833	858	57.3	--	42.7
South Carolina	673	895	956	44.4	--	55.6
Georgia	618	755	897	45.2	--	54.8
Florida	10	15	45	52.0	--	48.0
Alabama	114	202	274	44.7	--	55.3
Southeast	3,012	3,451	3,772	44.0	--	56.0
Mississippi	87	314	504	67.1	--	32.9
Louisiana	531	674	714	29.8	--	70.2
Arkansas	474	527	633	24.8	--	75.2
Delta States	1,092	1,545	1,851	38.2	--	61.8
Oklahoma	5,974	6,009	7,287	81.8	--	18.2
Texas	4,844	5,103	7,919	82.4	--	17.6
Oklahoma-Texas	10,818	11,112	15,206	82.1	--	17.9
Montana	3,660	4,770	5,109	80.8	3.0	16.2
Idaho	1,388	1,440	1,585	67.5	.9	31.6
Wyoming	381	460	530	53.6	2.9	43.5
Colorado	1,569	2,157	2,574	63.4	1.3	35.3
New Mexico	266	301	379	81.5	.3	18.2
Arizona	86	106	131	88.0	1.9	10.1
Utah	373	434	469	50.3	.1	49.6
Nevada	31	45	49	85.7	--	14.3
Mountain	7,754	9,713	10,826	72.2	2.0	25.8
Washington	2,412	2,511	2,814	90.0	.2	9.8
Oregon	1,396	1,397	1,484	89.4	1.5	9.1
California	2,361	2,478	2,570	93.0	5.2	1.8
Pacific	6,169	6,386	6,868	91.0	2.4	6.6
United States	110,440	114,283	125,062	51.7	10.6	37.7

1/ Includes wheat, oats, barley, rye, flaxseed, buckwheat, and rice.

Production of wheat has long been highly mechanized. There were more combines in 1945 than ever before and a higher percentage of the crop was undoubtedly combined than ever before. Combines were used for harvesting wheat before the turn of the 20th century, but for years the combine method made little headway. Probably only 5 percent of the acreage was combine harvested in 1920. Before World War I, practically no combines were used except in California and the Pacific Northwest. They were drawn by big teams and wheel traction was used as a source of power for operating the thresher-separator unit. Relatively small tractor-drawn combines, equipped with auxiliary motors, were gradually developed and were introduced in the wheat areas of the Mountain and Plains States during World War I.

The introduction of the small combine in the early 30's was mainly responsible for the use of combines in the Corn Belt, the Northeast, and the more humid southern areas where small-grain acreages per farm are usually limited. Soybeans for grain are usually harvested with the combine and with the marked expansion of acreage in the war years, many farmers in the Corn Belt bought combines primarily for soybeans and these combines were available for the small grain harvest.

In 1938, about 49 percent of the country's wheat acreage was combine-harvested (table 2). Since 1938, use of the combine has increased in all parts of the country, and in 1945 about 78 percent of the acreage was harvested with combines. About 70 percent of the 1945 acreage was combined as standing grain and about 8 percent was combined from the windrow.

For information by counties see figure 1, which shows that in most counties of the Southern and Central Plains States, in California, the Palouse area, and in some counties of the Corn Belt, the Mountain and Southeast States, 90 percent or more of the 1945 harvested wheat acreage was combined either as standing grain or from the windrow. The combine method has made little progress in many counties of the Appalachian and Lake States, and in the Ozarks.

Information by counties concerning windrow combining of wheat is found in figure 2. Harvesting wheat by combining from the windrow is confined mainly to the spring wheat counties of the Great Plains and Lake States and some of the Northern counties of the Western and Central Corn Belt States. It was most important in the Red River Valley counties of North Dakota. Windrow-combining is usually done in areas in which the crop ripens unevenly and where there are many weeds. Rainfall during the harvest season increases somewhat the quantity of grain combined from the windrow.

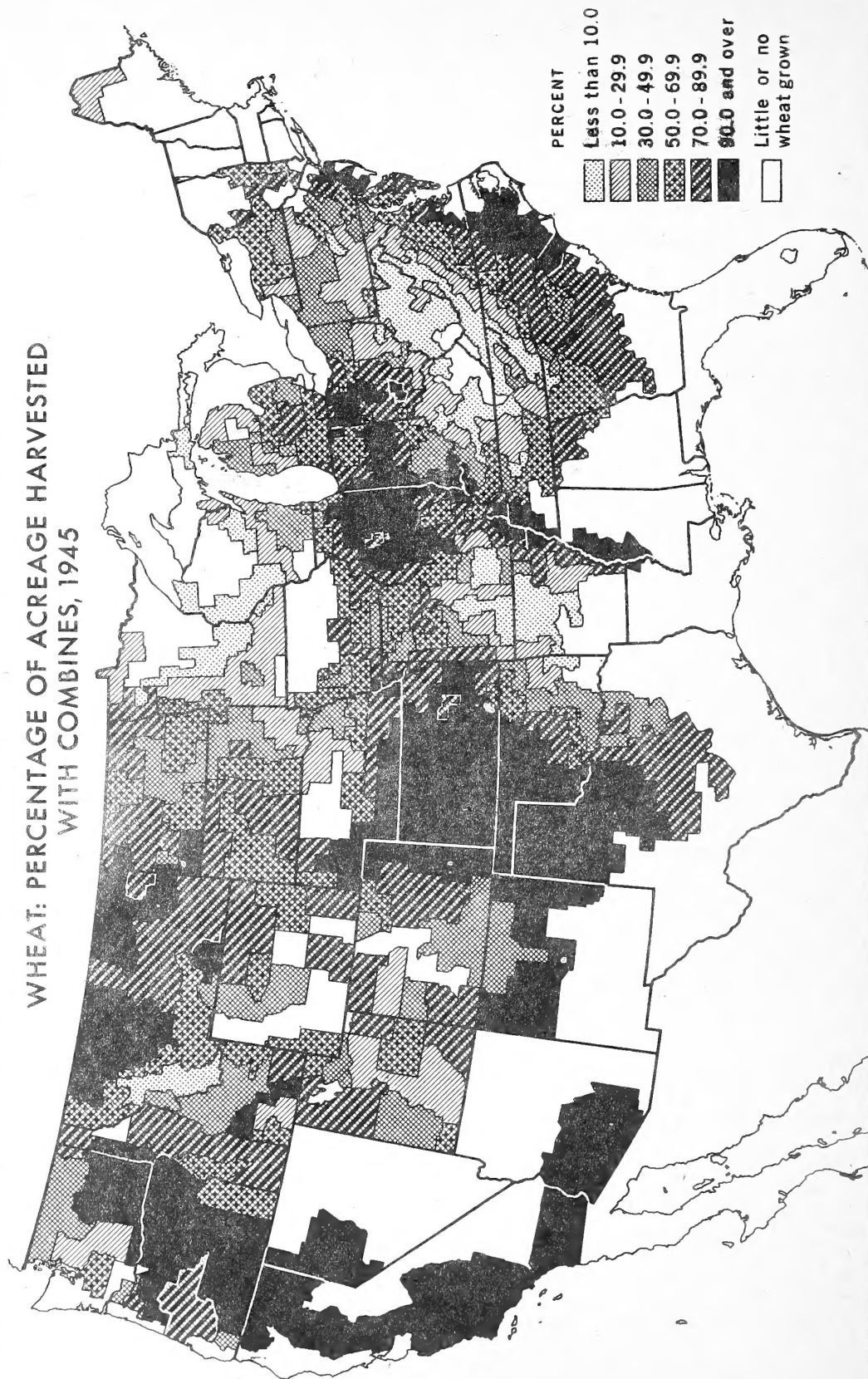
Stationary threshers were used for more than half of the wheat in the Appalachian States, the Northeastern States, and the Lake States. In areas of the West where the demand for straw is above average, they continue to be fairly important. Most of the wheat threshed with them is cut with binders, although some in the Appalachian and Southern States is still cut with cradles.

Table 2.- Wheat harvested by specified methods, by States and State groups, 1938 and 1945

State	Percentage of 1938 acres that was:				Percentage of 1945 acreage that was:			
	Acres har- vested in 1938	Com- bined	Har- vested with binders	Har- vested by all other methods	Acres har- vested in 1945	Combined	Threshed with stationary threshers or cut and fed	unthreshed
	1,000 acres	Percent	Percent	Percent	1,000 acres	Percent	Percent	Percent
Maine	3	1/	1/	1/	1	2/ 25.0	-	2/ 75.0
New York	302	11	87	2	346	47.9	.1	52.0
New Jersey	61	24	73	3	63	86.9	.1	13.0
Pennsylvania	1,019	6	92	2	932	34.8	.2	65.0
Delaware	80	11	89	4/	67	61.0	-	39.0
Maryland	457	3	96	1	366	35.0	-	65.0
Northeast	1,922	3/ 6	3/ 91	3/ 3	1,775	40.2	.1	59.7
Ohio	2,379	22	77	1	2,129	65.6	.4	34.0
Indiana	1,769	30	69	1	1,555	73.0	1.0	26.0
Illinois	2,212	44	55	1	1,339	80.0	1.0	19.0
Iowa	583	28	72	4/	140	47.0	10.0	43.0
Missouri	2,499	22	76	2	1,304	51.0	1.0	48.0
Corn Belt	9,442	29	70	1	6,467	67.0	1.0	32.0
Michigan	910	16	84	4/	982	62.0	1.0	37.0
Wisconsin	120	3	96	1	60	2/ 19.0	2/ 1.0	2/ 80.0
Minnesota	2,554	6	94	4/	1,100	2.0	26.0	72.0
Lake States	3,584	8	92	4/	2,142	30.0	13.9	56.1
North Dakota	8,082	23	70	7	9,855	31.0	35.0	34.0
South Dakota	3,095	19	71	10	3,201	26.0	33.0	41.0
Nebraska	4,691	51	48	1	3,596	77.0	2.0	21.0
Kansas	14,494	82	16	2	13,416	95.6	.4	4.0
Great Plains	30,362	55	42	3	30,068	64.8	15.4	19.8
West Virginia	135	1	58	41	87	4.0	-	96.0
Kentucky	552	8	85	7	371	43.0	-	57.0
Tennessee	486	6	85	9	364	37.0	-	63.0
Appalachian	1,173	6	82	12	822	36.3	-	63.7
Virginia	590	3	83	14	490	29.0	-	71.0
North Carolina	480	11	67	22	408	69.0	-	31.0
South Carolina	161	8	62	30	205	74.0	-	26.0
Georgia	165	11	45	44	183	71.0	-	29.0
Alabama	5	22	35	43	21	74.0	-	26.0
Southeast	1,401	7	71	22	1,307	55.2	-	44.8
Mississippi	-	-	-	-	18	90.0	-	10.0
Arkansas	66	12	68	20	39	50.0	-	50.0
Delta States	66	12	68	20	57	62.0	-	38.0
Oklahoma	5,607	70	28	2	5,910	91.0	-	9.0
Texas	3,894	82	18	4/	5,350	93.0	-	7.0
Oklahoma-Texas	9,501	75	24	1	11,260	92.0	-	8.0
Montana	4,249	55	40	5	3,777	85.0	2.0	13.0
Idaho	1,169	40	57	3	1,102	69.0	1.0	30.0
Wyoming	257	32	60	8	232	65.0	2.0	33.0
Colorado	1,273	44	41	15	1,483	70.0	1.0	29.0
New Mexico	258	5/ 80	5/ 15	5/ 5	297	90.0	.1	9.9
Arizona	50	93	7	4/	24	95.0	-	5.0
Utah	293	41	56	3	279	55.0	-	45.0
Nevada	22	63	24	13	20	92.0	-	8.0
Mountain	7,571	50	44	6	7,214	77.9	1.5	20.6
Washington	2,257	83	14	3	2,524	92.8	.2	7.0
Oregon	1,068	78	21	1	921	93.2	.8	6.0
California	850	95	4	1	563	98.4	.6	1.0
Pacific	4,175	84	14	2	4,008	93.7	.4	5.9
United States	69,197	3/ 49	3/ 47	3/ 4	65,120	70.6	7.8	21.6

1/ No information obtained. 2/ No reports received from crop correspondents. Estimates based largely on reports supplied in adjacent or nearby States. 3/ Average for States reporting. 4/ Less than one-half of 1 percent. 5/ Figures revised from those originally published in "Farm Labor Report," July 1939.

WHEAT: PERCENTAGE OF ACREAGE HARVESTED WITH COMBINES, 1945



WHEAT: PERCENTAGE OF ACREAGE COMBINED
FROM WINDROW, 1945

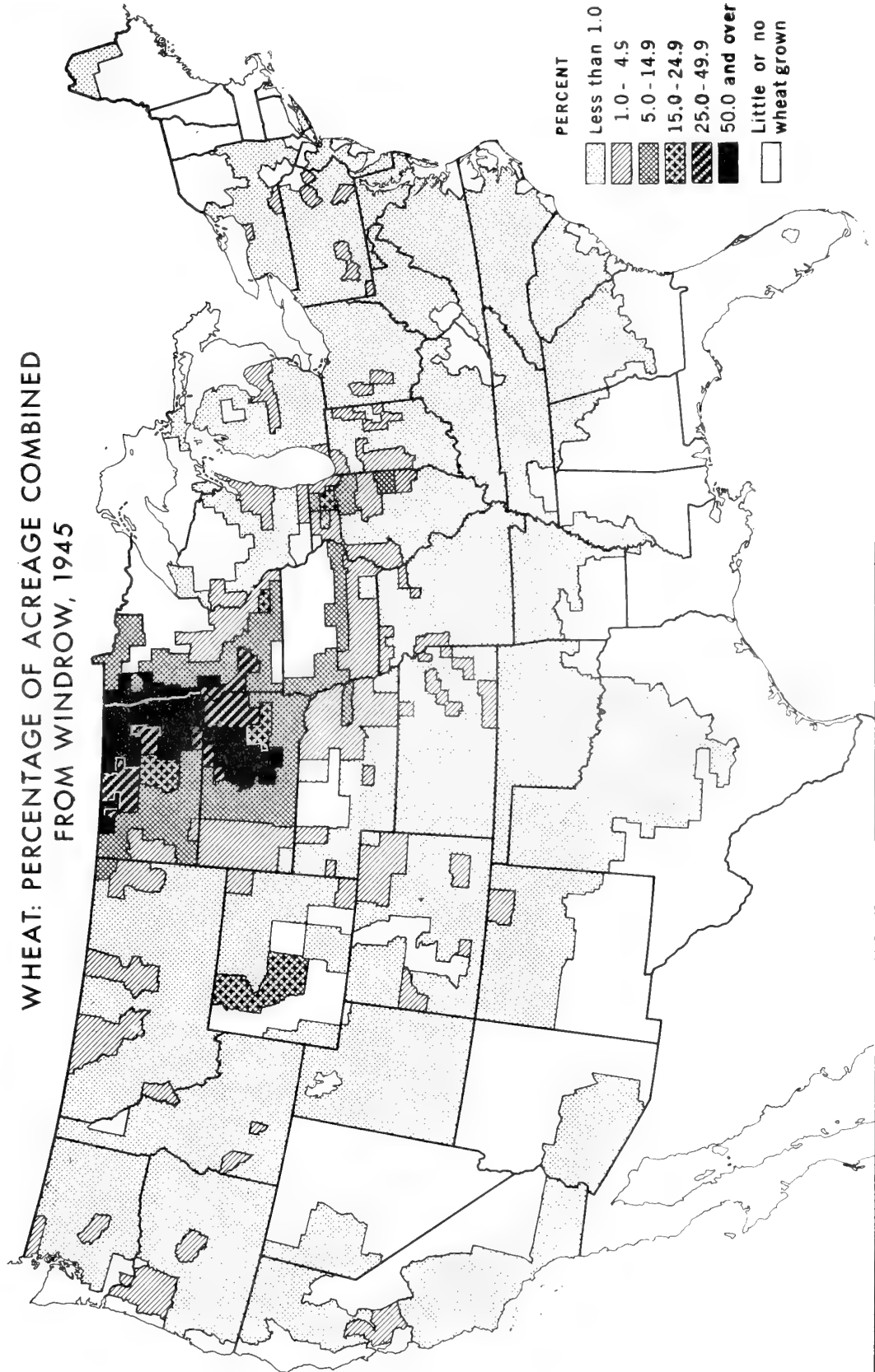


FIGURE 2

Oats for Grain

With a record yield of 36.6 bushels per harvested acre, and with a harvested acreage only about 8 percent below the record of 1921, the 1945 oat crop of 1,536 million bushels was our largest to date. The introduction of new high-yielding varieties has placed oats in an improved competitive position with other crops. Both acreage and production have increased, especially in the Great Plains, the Delta States, and the Southeastern States.

For the country as a whole, the combine method has not made great headway in the harvesting of oats. More than 61 percent of the 1945 acreage was threshed with stationary threshers or was cut and fed unthreshed (table 3). Cutting ripe oats and feeding them unthreshed is done fairly extensively in the Delta States, the Southeastern States, some Northeastern States, and in local areas in the Western States. Little of this is done in the Corn Belt, the Lake States, and the Great Plains where most of the oat crop is grown.

About 38 percent of the 1945 acreage of oats was harvested with combines, while in 1938 only 10 percent of the acreage was combined. In that year only 9 States reported harvesting 20 percent or more of the oats harvested for grain with combines; in 1945, in 16 States, more than half the acreage was combined. In most areas, oat straw for feed and for bedding is preferred to the straw of other small grains. When the straw is saved, the combine and the binder-thresher use about the same labor. Oats often ripen less evenly and are more subject to stem breakage after ripening than most other major small-grain crops and some varieties are likely to shatter considerably if left standing until fully ripe. Also new rust-resistant varieties of oats often ripen the grain while the straw is partially green. These factors influence the method of harvesting and are partly responsible for the low percentage harvested as standing grain with the combine.

Almost one-third of the acreage of oats harvested with combines was windrow-combined, whereas only about 10 percent of the wheat acreage harvested with combines was from the windrow. Combining from the windrow was most important in North Dakota, South Dakota, Minnesota, Iowa, and Illinois. It was fairly important in Nebraska, Indiana, Oregon and California. It was reported on a small scale in some other States. No information was obtained from crop correspondents in the Southern States concerning combining from the windrow but it is believed that little if any is done there. More than 65 percent of the 1945 harvested acreage of oats in the Lake States, the Great Plains, the Northeastern States, and the Appalachian States was threshed with stationary threshers or cut and fed unthreshed. In most counties of California and in some counties in Oregon, Texas, and in the Corn Belt States, 90 percent or more of the 1945 oat crop was combined (fig. 3).

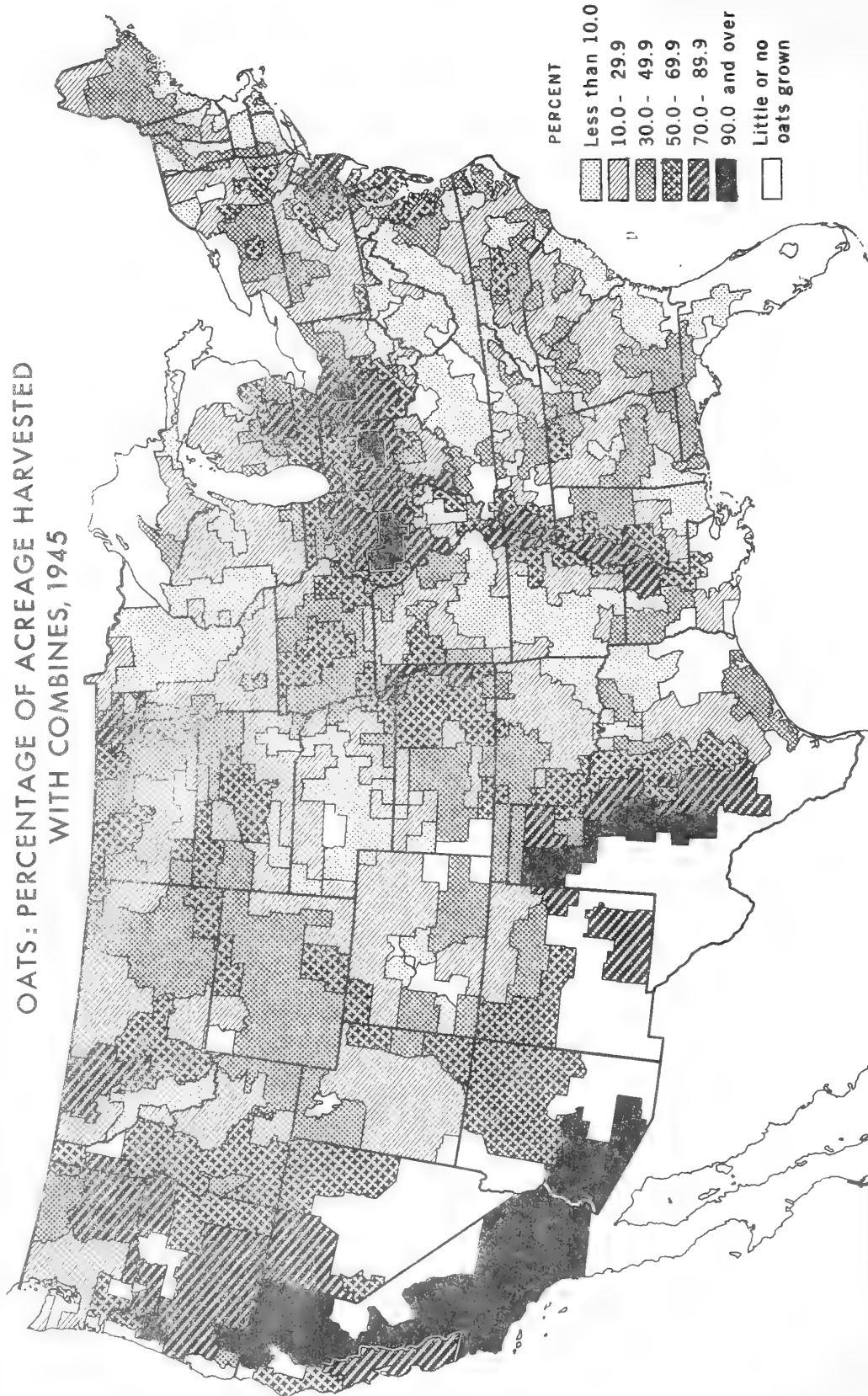
Table 3.- Oats harvested by specified methods by States and State groups, 1938 and 1945

State	Acres har- vested for grain in 1938	Percentage of 1938 acreage that was:			Acres har- vested for grain in 1945	Percentage of 1945 acreage that was:			Threshed with stationary thresher or cut and fed unthreshed
		Com- bined	Har- vested with binders	Har- vested by all other methods		As standing grain	From windrow	or cut and fed	
	1,000 acres	Percent	Percent	Percent	1,000 acres	Percent	Percent	Percent	
New England	174	1/	1/	1/	137	21.9	.1	78.0	
New York	798	5	86	9	663	30.0	.2	69.8	
New Jersey	46	18	70	12	42	77.0	.2	22.8	
Pennsylvania	870	4	91	5	806	30.0	.2	69.8	
Delaware	2	5	93	-	5	60.0	-	40.0	
Maryland	35	2	92	6	37	19.0	.2	80.8	
Northeast	1,925	2/ 5	2/ 88	2/ 7	1,690	30.4	.2	69.4	
Ohio	1,121	14	85	1	1,162	62.0	2.0	36.0	
Indiana	1,310	20	78	2	1,371	61.0	6.0	33.0	
Illinois	3,591	22	77	1	3,372	45.0	22.0	33.0	
Iowa	5,972	8	91	1	5,323	18.0	22.0	60.0	
Missouri	1,855	9	82	9	1,511	29.0	3.0	68.0	
Corn Belt	13,849	13	85	2	12,739	35.1	16.2	48.7	
Michigan	1,261	9	89	2	1,505	50.0	2.0	48.0	
Wisconsin	2,455	3	95	2	2,987	13.0	1.0	86.0	
Minnesota	3,900	3	96	1	5,392	2.0	17.0	81.0	
Lake States	7,616	4	95	1	9,884	12.6	9.9	77.5	
North Dakota	1,390	6	89	5	2,653	7.0	35.0	58.0	
South Dakota	1,564	2	96	2	3,497	4.0	24.0	72.0	
Nebraska	1,797	6	92	2	2,439	19.0	6.0	75.0	
Kansas	1,471	18	80	2	968	47.0	2.0	51.0	
Great Plains	6,222	8	89	3	9,557	13.0	20.2	66.8	
West Virginia	86	2	35	63	72	2.0	-	98.0	
Kentucky	70	3	62	35	88	15.0	-	85.0	
Tennessee	85	5	71	24	245	30.0	-	70.0	
Appalachian	241	3	56	41	405	21.7	-	78.3	
Virginia	105	4	60	36	142	14.0	-	86.0	
North Carolina	242	12	44	44	375	44.0	-	56.0	
South Carolina	491	7	53	40	714	35.0	-	65.0	
Georgia	440	7	41	52	695	38.0	-	62.0	
Florida	10	1/	1/	1/	45	52.0	-	48.0	
Alabama	112	10	18	72	251	42.0	-	58.0	
Southeast	1,400	2/ 8	2/ 45	2/ 47	2,222	37.3	-	62.7	
Mississippi	104	23	19	58	480	66.0	-	34.0	
Louisiana	57	26	22	52	131	60.0	-	40.0	
Arkansas	218	4	41	55	304	35.0	-	65.0	
Delta States	379	13	32	55	915	54.8	-	45.2	
Oklahoma	1,463	10	84	6	1,104	32.0	.2	67.8	
Texas	1,618	18	73	9	1,837	55.0	-	45.0	
Oklahoma-Texas	3,081	14	78	8	2,941	46.4	.1	53.5	
Montana	298	10	81	9	323	44.0	3.0	53.0	
Idaho	149	25	73	2	171	54.0	1.0	45.0	
Wyoming	124	7	80	13	164	35.0	4.0	61.0	
Colorado	163	7	86	7	220	25.0	1.0	74.0	
New Mexico	30	15	74	11	43	40.0	-	60.0	
Arizona	7	22	78	-	12	65.0	-	35.0	
Utah	37	6	94	-	50	33.0	-	67.0	
Nevada	4	47	53	-	9	80.0	-	20.0	
Mountain	812	12	81	7	992	39.9	2.0	58.1	
Washington	148	35	59	6	150	53.0	1.0	46.0	
Oregon	241	37	61	2	273	75.0	5.0	20.0	
California	128	1/	1/	1/	165	83.0	7.0	10.0	
Pacific	517	2/ 36	2/ 60	2/ 4	588	71.6	4.6	23.8	
United States	36,042	2/ 10	2/ 85	2/ 5	41,933	26.4	12.0	61.6	

1/ No information obtained.

2/ Average of reporting States.

OATS: PERCENTAGE OF ACREAGE HARVESTED WITH COMBINES, 1945



U. S. DEPARTMENT OF AGRICULTURE

NEG. 46323 BUREAU OF AGRICULTURAL ECONOMICS

FIGURE 3

Barley

The acreage of barley harvested in 1945 was the smallest since 1937, and about 17 percent below the 1935-44 average. The yield per harvested acre, however, was about the same as the high yields of 1941 and 1942 and the production was only about 8 percent below average. In recent years the reduction in barley acreage has been most pronounced in the Corn Belt, the Lake States, and in Nebraska and Kansas, but increases were reported in North Dakota and in most of the Mountain and Pacific Coast States (table 4). North Dakota, South Dakota, and California, the three leading barley-producing States, accounted for about two-thirds of the harvested acreage in 1945 but, owing to the relatively low yields in North Dakota and South Dakota, they contributed less than half of the total barley production in the United States.

About 64 percent of the 1945 crop was harvested with combines. About 48 percent was combined as standing grain and about 16 percent was combined from the windrow. In North Dakota, South Dakota, and Minnesota, where spring barley is grown, combining from the windrow took the lead. In North Dakota a larger percentage of the barley acreage was combined from the windrow than was true of oats or wheat; in South Dakota the percentage was larger than for wheat but slightly smaller than for oats. The principal reasons for the relatively high percentage in these States is the heavy concentration in areas where windrow-combining of small grains is generally followed and the tendency of some varieties of barley to shatter badly if left standing until fully ripe.

In Ohio and most of the Northeastern States a somewhat higher percentage of the barley acreage was combined than any other of the small grains.

In about one-third of the States, 50 percent or more of the barley was threshed with stationary threshers or cut and fed unthreshed.

Rye

Rye acreage has decreased so sharply in recent years that the 1.9 million acres harvested in 1945 was about 45 percent below the 1935-44 average, and except for 1946, was the smallest harvested acreage in more than 60 years. The 1945 yield per harvested acre was slightly above the 1935-44 average yield but the production of nearly 24 million bushels was about 43 percent below the average production of 1935-44.

Although some rye is harvested for grain in 35 States, about half of the 1945 harvested acreage was in 5 States--Nebraska, South Dakota, North Dakota, Minnesota, and Wisconsin. For the country as a whole about 41 percent of the acreage was combined as standing grain and 9 percent was combined from the windrow. About 50 percent was threshed with stationary threshers (table 5).

In Oklahoma-Texas, and the Pacific Coast States 80 percent or more of the acreage was harvested with combines. The percentage of rye so harvested in the Corn Belt was above the United States average.

In the Great Plains States only about half the acreage was harvested with combines and more than 75 percent in the Lake States was threshed with stationary threshers. Most of the acreage combined from the windrow was in North Dakota, South Dakota, and Minnesota.

Table 4.- Barley harvested by specified methods, by States and State groups, 1945 crop

State	Total acres harvested			Percentage of 1945 acreage that was:		
	1935-39 average	1940-44 average	1945	Combined		
				As	standing: From	Threshed with stationary
				grain	windrow: cut and fed	thresher or unthreshed
	1,000 acres	1,000 acres	1,000 acres	Percent	Percent	Percent
New England	10	9	6	1/32.0	—	1/68.0
New York	146	110	102	1/56.8	1/.2	1/43.0
New Jersey	3	8	8	94.9	.1	5.0
Pennsylvania	72	131	102	39.8	.2	60.0
Delaware	1	7	10	77.8	.2	22.0
Maryland	43	76	65	29.9	.1	70.0
Northeast	275	341	293	46.1	.2	53.7
Ohio	20	40	23	80.0	1.0	19.0
Indiana	24	68	44	70.0	1.0	29.0
Illinois	109	109	31	74.0	5.0	21.0
Iowa	465	185	3	1/35.0	1/15.0	1/50.0
Missouri	123	152	66	43.0	1.0	56.0
Corn Belt	741	554	167	60.8	2.0	37.2
Michigan	196	185	118	1/52.0	1/2.0	1/46.0
Wisconsin	830	445	90	14.0	2.0	84.0
Minnesota	2,075	1,432	447	1.0	27.0	72.0
Lake States	3,101	2,062	655	12.0	19.0	69.0
North Dakota	1,404	2,218	2,284	10.0	45.0	45.0
South Dakota	1,411	1,916	1,299	11.0	29.0	60.0
Nebraska	745	1,520	610	45.0	3.0	52.0
Kansas	392	1,127	383	78.2	1.8	20.0
Great Plains	3,952	6,781	4,576	20.7	31.2	48.1
West Virginia	6	11	9	5.0	—	95.0
Kentucky	29	93	55	37.0	—	63.0
Tennessee	38	92	98	56.0	—	44.0
Appalachian	73	196	162	46.8	—	53.2
Virginia	52	77	68	26.0	—	74.0
North Carolina	11	36	40	71.0	—	29.0
South Carolina	4	10	21	67.0	—	33.0
Georgia	—	8	9	61.0	—	39.0
Alabama	—	3	2	81.0	—	19.0
Southeast	67	134	140	48.0	—	52.0
Mississippi	—	4	6	90.0	—	10.0
Arkansas	8	10	9	30.0	—	70.0
Delta States	8	14	15	54.0	—	46.0
Oklahoma	209	430	185	85.0	—	15.0
Texas	136	301	248	88.0	—	12.0
Oklahoma-Texas	345	731	433	86.7	—	13.3
Montana	124	380	672	77.0	4.0	19.0
Idaho	152	337	307	69.5	.5	30.0
Wyoming	64	101	124	56.0	3.0	41.0
Colorado	409	638	791	61.0	2.0	37.0
New Mexico	10	25	34	63.0	2.0	35.0
Arizona	30	53	78	89.7	.3	10.0
Utah	76	135	130	47.8	.2	52.0
Nevada	10	21	20	82.0	—	18.0
Mountain	875	1,690	2,156	67.4	2.3	30.3
Washington	69	229	125	79.9	.1	20.0
Oregon	137	250	257	92.5	.5	7.0
California	1,173	1,302	1,486	97.0	2.0	1.0
Pacific	1,379	1,781	1,868	95.2	1.7	3.1
United States	10,816	14,284	10,465	47.9	15.7	36.4

1/ No reports received from crop correspondents. Estimates based largely on reports supplied in adjacent or nearby States.

Table 5.- Rye harvested by specified methods, by States and State groups, 1945 crop 1/

State	Total acres harvested			Percentage of 1945 acreage that was:		
	1935-39 average	1940-44 average	1945	Combined		
				As standing grain	From windrow	Threshed with stationary thresher or cut and fed
	1,000 acres	1,000 acres	1,000 acres	Percent	Percent	Percent
New York	22	18	10	44.8	.2	55.0
New Jersey	19	15	13	79.9	.1	20.0
Pennsylvania	75	54	41	29.8	.2	70.0
Delaware	7	12	19	66.8	.2	33.0
Maryland	16	19	20	49.8	.2	50.0
Northeast	139	118	103	48.2	.2	51.6
Ohio	58	73	27	59.8	.2	40.0
Indiana	139	118	70	70.0	1.0	29.0
Illinois	100	58	47	69.0	1.0	30.0
Iowa	120	19	11	36.0	7.0	57.0
Missouri	53	43	41	47.0	1.0	52.0
Corn Belt	470	311	196	61.7	1.2	37.1
Michigan	139	71	56	49.0	1.0	50.0
Wisconsin	282	134	95	12.0	1.0	87.0
Minnesota	484	215	107	3.0	14.0	83.0
Lake States	905	420	258	16.3	6.4	77.3
North Dakota	762	624	115	11.0	42.0	47.0
South Dakota	549	582	290	16.0	32.0	52.0
Nebraska	379	370	361	41.0	2.0	57.0
Kansas	66	99	81	79.0	1.0	20.0
Great Plains	1,756	1,675	847	32.0	17.6	50.4
West Virginia	9	4	4	3.0	—	97.0
Kentucky	14	23	40	33.0	—	67.0
Tennessee	38	41	34	35.0	—	65.0
Appalachian	61	68	78	32.3	—	67.7
Virginia	44	42	36	30.0	—	70.0
North Carolina	58	42	31	53.0	—	47.0
South Carolina	14	25	16	55.0	—	45.0
Georgia	21	22	10	60.0	—	40.0
Southeast	137	131	93	45.2	—	54.8
Oklahoma	56	131	74	82.0	—	18.0
Texas	8	22	21	83.0	—	17.0
Oklahoma-Texas	64	153	95	82.2	—	17.8
Montana	39	39	17	73.0	2.0	25.0
Idaho	7	7	5	64.0	1.0	35.0
Wyoming	18	21	8	66.0	1.0	33.0
Colorado	39	87	80	70.0	1.0	29.0
New Mexico	3	12	5	62.0	4.0	34.0
Utah	3	6	10	39.7	.3	60.0
Mountain	109	172	125	67.2	1.2	31.6
Washington	16	25	15	67.0	.2	32.8
Oregon	34	38	33	80.0	.5	19.5
California	8	10	13	95.0	.5	4.5
Pacific	58	73	61	80.0	.4	19.6
United States	3,699	3,121	1,856	41.0	9.2	49.8

1/ Reports received from crop correspondents in Wisconsin, Minnesota, North Dakota, South Dakota, and Nebraska. Estimates in other areas based largely on harvest practices for other small grains for which reports were received.

Flaxseed

The outbreak of World War II reduced our imports of vegetable oils. This brought a great expansion in the acreage of flaxseed and other oil-producing crops. Both acreage and production of flaxseed in 1945 were the fourth largest of record, being exceeded only in 1902, 1942, and 1943. Although in 1945 both acreage and production were more than 40 percent above their 1935-44 averages, they were somewhat below the 1940-44 averages which were influenced by the large crops of 1942 and 1943.

Although flaxseed acreage was estimated in 1945 in 16 States, 4 States, Minnesota, North Dakota, South Dakota and Montana had about 90 percent of the harvested acreage and more than 85 percent of the production. For the country as a whole, 62 percent of the crop was threshed with combine harvester-threshers. As the bulk of the flaxseed is grown in parts of the Northern Great Plains and the Red River Valley, where combining from the windrow is relatively important, a higher proportion of the acreage of flaxseed was windrow-combined than was the case for any other small grain (table 6). Then, too flax is more subject to weed infestation than are other small grains.

Table 6.- Flaxseed harvested by specified methods, by States, 1945 crop

State	Harvested acres ^{1/}			Percentage of 1945 acreage that was		
	1935-39	1940-44	1945	Combined as standing grain	Combined from windrow	Threshed with stationary threshers
	average	average				
	Thousands	Thousands	Thousands	Percent	Percent	Percent
Iowa	30	237	75	13.0	53.0	34.0
Minnesota	709	1,411	1,067	4.0	30.0	66.0
North Dakota	418	1,119	1,525	35.0	36.0	29.0
South Dakota	98	346	441	7.0	47.0	46.0
Kansas	61	191	122	2/ 78.0	2/ 10.0	2/ 12.0
Texas	—	26	63	2/ 98.0	—	2/ 2.0
Montana	41	270	320	2/ 76.0	2/ 13.0	2/ 11.0
Arizona	5	17	17	87.0	13.0	—
California	53	198	113	70.0	29.0	1.0
All other States	36	89	42	2/ 47.0	2/ 11.0	2/ 42.0
United States	1,451	3,904	3,785	29.8	32.0	38.2

^{1/} Does not include acreage of flax grown for fiber.

^{2/} No reports received from crop correspondents. Estimates based largely on reports supplied in adjacent or nearby States.

Buckwheat

Acres and production of buckwheat have been declining for years. The 409 thousand acres of buckwheat harvested in 1945 was only about half as large as the acreage usually harvested around 1920 and slightly below the average of 1935-44.

Although in 1945 the acreage of buckwheat was estimated in 20 States, Pennsylvania and New York together had more than half of the harvested acreage and production. Farmers who grow buckwheat usually have only a few acres and the fields are rather hilly, so stationary threshers are still much used. Almost two-thirds of the 1945 acreage was threshed with them. Only about a third was combined, and that mostly as standing grain (table 7). A smaller percentage of the buckwheat acreage was combined than of any other small-grain crop.

Table 7.- Acreage of buckwheat harvested by specified methods, by States, and State groups, 1945 crop 1/

State	Harvested acres			Percentage of 1945 acreage that was		
	1935-39 average	1940-44 average	1945	Combined as standing grain	Combined from windrow	Threshed with stationary threshers
	Thousands	Thousands	Thousands	Percent	Percent	Percent
New York	138	138	98	43.0	.2	56.8
Pennsylvania	130	124	109	29.0	.1	70.9
All other Northeast States	18	14	13	18.9	.1	81.0
Northeast	286	276	220	34.6	.2	65.2
Michigan	25	30	25	65.0	.1	34.9
Wisconsin	13	17	19	15.0	.1	84.9
Minnesota	15	34	45	2.0	8.0	90.0
Lake States	53	81	89	22.5	4.1	73.4
Corn Belt	42	33	60	53.2	.4	46.4
Great Plains	10	6	11	5.7	43.2	51.1
Appalachian	21	16	19	4.6	—	95.4
Southeast	13	13	10	4.0	—	96.0
United States	425	425	409	31.8	2.2	66.0

1/ Reports received from crop correspondents in New York and Michigan. Estimates in other areas based largely on harvest practices for other small grains for which reports were received.

Rice

Expansion in rice acreage has been rather pronounced. The 1945 harvested acreage was about 28 percent above the 1935-44 average, and only 5 percent below the record high of 1946. The yield per acre in 1945 was slightly below average, but the crop of more than 40 million bushels was the largest thus far produced.

Information obtained from rice specialists in rice-producing States and from published State reports show that about 42 percent of the 1945 acreage was combined, mostly as standing grain. In California, where combines have long been used for harvesting rice, about 97 percent of the acreage was combined, with an estimated one-fourth combined from the windrow. In the humid Eastern rice areas combines made little headway until mechanical dryers were installed, but an estimated 60 percent of the Texas acreage, 23 percent of the Louisiana acreage, and 10 percent of the Arkansas acreage was harvested with combines in 1945 (table 8).

Before mechanical dryers were developed much of the rice harvested with the combine was from the windrow, as rice combined as standing grain usually had too much moisture for successful storing. Mechanical dryers are also used for some rice threshed with stationary threshers. Combines especially designed for operating in rice fields together with the mechanical dryers, have furthered the combining of rice. Mechanical dryers have contributed to a marked improvement in the milling quality of rice. "Sun checking" is greatly reduced and this means higher mill yields of unbroken or head rice. The new combines are of the track type, are self-propelled, and can be operated to better advantage than standard pull-type combines in the rice fields which have "wet spots" and sometimes water-logged areas.

It was estimated that in 1945 mechanical dryers were used on about 24 percent of the Louisiana rice crop, about 75 percent of the California crop, and about 60 percent of the Texas crop. No estimate was obtained for Arkansas but it is believed that about the same percentage of the crop was dried as was harvested with the combine.

In 1945, stationary threshers were used to thresh about 58 percent of the total rice crop, with this method accounting for about 3 percent of the crop in California, 40 percent in Texas, 77 percent in Louisiana, and 90 percent in Arkansas. As combines and mechanical dryers are increasing, especially in the humid rice areas, it is believed that the proportion of the crop combined was considerably larger in 1946 than in 1945.

Table 8.- Rice harvested by specified methods, by States, 1945 crop

State	Acres harvested			Percentage of 1945 acreage that was		
	1935-39 average	1940-44 average	1945	Combined as standing grain	Combined from windrow	Threshed with station- ary thresher
	Thousands	Thousands	Thousands	Percent	Percent	Percent
Arkansas	169	258	281	10.0	—	90.0
Louisiana	477	559	583	1/ 23.0	—	1/ 77.0
Texas	234	349	400	60.0	—	40.0
California	123	188	230	72.0	25.0	3.0
United States	1,003	1,334	1,494	38.0	3.9	58.1

1/ Adapted from the August 1945 issue of the Louisiana Rural Economist.

Custom Harvest Rates

Farmers have used custom machines and cooperatively owned machines for the small-grain harvest for many years. Before combines were adopted extensively, most of the threshing of small grain was done by custom threshers or by machines owned by groups of farmers. Few farmers had enough acres of small grain to warrant owning a separator-thresher.

Now many farmers own and operate the combines that harvest their crops and they often harvest small grains for their neighbors.

With stationary thresher, custom rates are influenced by such factors as the proportion of the threshing crew furnished by the thresherman, the volume of production per farm, and the general wage level. In most instances, farmers deliver their unthreshed grain to the thresher and move the threshed

grain to farm storage or to market. The thresherman usually furnishes only the crew needed to operate the thresher-separator and power unit. In some localities the thresherman may furnish the workers and teams to bring the grain to the thresher but even then the farmer usually takes the grain away after it is threshed.

Custom harvest rates for threshing are usually on a per bushel basis and custom combine rates on a per acre basis, but in some areas—especially in the Southeastern States, the Appalachian States, and the Delta States—often a share of the crop is paid for threshing or for combining. In instances in which a share of the crop was paid, the money equivalent was calculated and used in this report. Where small acreages are threshed with stationary threshers, a specified fee per "set" is often charged in addition to the per bushel rate. When low-yielding grain is combined, more acres can usually be covered each day than when the yield is high; so to equalize somewhat the returns per hour of machine use, a custom operator may charge a "flat" fee per acre for a specified minimum yield, plus an additional charge per bushel for higher yields.

Along with the marked increase in the general level of farm costs there has been a marked increase in custom rates for harvesting small grain. Custom rates for combining wheat in 1945, for the entire country, averaged more than 90 percent above the 1938 rates, with the largest increases reported for the Pacific Coast and Mountain States. For oats, the increase in custom combine rates from 1938 to 1945 averaged only about 56 percent (table 9); the bulk of this crop is grown in the Corn Belt and in the Lake States where relatively small increases in custom rates were reported.

In most sections the per acre custom combine rate was slightly higher for wheat than for oats, in both 1938 and 1945. The increase in custom rates for threshing oats, from 1938 to 1945, averaged about 33 percent. Many threshing machines in the important oat-producing States are owned cooperatively by farmers; in such cases, the fee charged for threshing largely reflects expenses other than labor of operating the threshing machines.

In many localities the thresherman furnishes practically the entire threshing crew and this is reflected in the high custom-threshing rates of North Dakota, Texas and some other States.

The cost of new machines and parts increased from 1938 to 1945. The increase, however, was less than the increase in wage rates. The rates per bushel for threshing oats in both 1938 and 1945, were below the average of the country in the Corn Belt and Lake States. There the yields of oats are large and the acreage per farm is above the average of the country. Threshing rates for oats, in 1938 and 1945, were generally above average in the Southern States where per acre yields of oats are low and where the acreage per farm is below average.

Table 9.- Custom combining rates per acre and threshing rates per bushel for specified years

State	Custom rate per acre for combining				Custom rate per bushel for threshing		
	Wheat		Oats		Wheat	Oats	
	1938	1945	1938	1945	1938	1938	1945
	Dollars	Dollars	Dollars	Dollars	Cents	Cents	Cents
New England	1/	1/	1/	1/	9.2	7.0	9.4
New York	3.15	4.45	3.15	4.35	6.3	4.8	6.5
New Jersey	3.95	5.40	3.85	4.95	10.3	6.9	8.6
Pennsylvania	3.20	4.00	3.15	4.00	5.9	4.2	5.8
Delaware	2.75	4.00	2.75	3.95	7.1	5.0	7.5
Maryland	2.70	4.20	3.00	4.20	6.1	4.5	6.5
Northeast	2/ 3.08	2/ 4.18	2/ 3.16	2/ 4.18	6.2	4.8	6.5
Ohio	2.50	3.70	2.50	3.60	5.8	3.7	5.0
Indiana	2.20	3.60	2.15	3.60	5.8	3.5	4.5
Illinois	2.20	3.60	2.10	3.20	5.3	2.7	3.3
Iowa	2.35	3.85	2.35	3.70	5.2	2.7	3.3
Missouri	2.30	3.50	2.25	3.40	6.1	3.6	5.5
Corn Belt	2.31	3.61	2.26	3.51	5.7	2.9	3.7
Michigan	2.65	3.55	2.65	3.55	5.3	3.8	4.9
Wisconsin	2.65	3.75	2.65	3.75	5.1	3.4	4.3
Minnesota	2.20	3.40	2.20	3.40	5.3	3.1	3.5
Lake States	2.33	3.48	2.42	3.53	5.3	3.3	4.0
North Dakota	1.80	3.65	1.90	3.55	9.0	5.4	7.1
South Dakota	1.70	3.60	1.95	3.55	6.2	3.5	4.3
Nebraska	2.05	3.90	2.10	3.70	5.5	3.5	4.9
Kansas	1.85	3.40	2.05	3.20	5.6	4.2	6.8
Great Plains	1.85	3.56	2.01	3.55	5.9	4.0	5.3
West Virginia	2.80	4.00	2.75	4.00	6.2	4.6	7.3
Kentucky	2.55	4.15	2.35	4.05	8.3	5.1	8.5
Tennessee	2.55	4.00	2.65	4.15	7.9	5.3	8.3
Appalachian	2.58	4.06	2.60	4.10	7.9	5.0	8.1
Virginia	2.85	4.10	3.20	4.10	5.9	4.4	7.0
North Carolina	2.90	3.90	2.60	4.00	6.1	4.1	7.3
South Carolina	2.80	4.00	2.75	4.00	8.7	4.8	7.5
Georgia	2.65	4.00	2.50	4.00	8.9	5.3	8.0
Alabama	2.30	4.00	2.25	4.00	9.3	5.9	8.5
Southeast	2.84	4.00	2.64	4.01	6.5	4.9	7.7
Mississippi	-	4.10	2.45	4.05	-	7.1	9.0
Louisiana	-	-	3.90	5.00	-	6.1	8.5
Arkansas	1.90	4.20	1.75	4.15	7.6	4.7	7.2
Delta States	1.90	4.17	2.27	4.24	7.6	5.7	8.4
Oklahoma	1.70	3.00	1.85	3.05	8.0	4.4	7.3
Texas	1.40	2.70	2.10	3.10	9.3	4.9	11.0
Oklahoma-Texas	1.58	2.86	1.98	3.08	8.5	4.7	9.8
Montana	1.80	3.30	1.85	3.25	7.3	4.7	5.7
Idaho	2.60	5.60	2.75	5.60	5.8	4.6	6.4
Wyoming	2.00	3.75	2.35	3.65	5.8	4.2	5.6
Colorado	1.95	4.35	2.75	4.15	6.5	5.0	8.7
New Mexico	1.40	2.75	2.60	3.50	7.9	5.5	8.0
Arizona	3.15	5.50	2.85	5.50	10.0	7.0	9.5
Utah	2.40	4.30	2.80	4.50	6.7	5.5	7.6
Nevada	4.10	5.50	3.75	5.30	10.0	7.0	9.0
Mountain	1.98	3.91	2.36	4.02	6.8	4.8	6.8
Washington	2.40	5.90	2.75	6.80	7.3	4.9	7.0
Oregon	2.25	4.90	3.40	4.80	5.7	4.4	6.0
California	2.35	4.55	1/	4.75	9.0	1/	6.0
Pacific	2.35	5.50	2/ 3.15	5.30	7.2	2/ 4.7	6.5
United States	2/ 1.90	2/ 3.66	2/ 2.30	2/ 3.59	6.6	2/ 3.6	4.8

1/ No information obtained.

2/ Average for States reporting.

UTILIZATION OF STRAW

The estimates in this report, which relate to total production of straw if cut at ground level and the quantity of recoverable straw, should be considered only as fairly close approximations. The ratio of production of straw to grain is known to vary somewhat from year to year. It is influenced principally by weather and by damage from disease and insects. Also for a given small-grain crop, the straw-grain ratio varies with the different varieties. The straw-grain ratios of this report represent approximately average straw-grain ratios for the different grain crops and are based chiefly on experimental data supplied by specialists of the Bureau of Plant Industry, Soils, and Agricultural Engineering.

The proportion of the total production of straw that is recoverable for farm uses—as for bedding, feed or for sale—depends largely upon the height at which the crop is cut and the method of threshing. With binders, reapers, cradles, and mowers, farmers usually cut their grain at a lower level than is done with windrowers or combines. The stationary threshers lose practically no straw, but when combines are used, the chaff, short straw, and long straw are usually so scattered over the stubble and ground surface that only the long straw can be readily collected.

The straw-grain ratios for the different small grains and for the specified harvest methods are shown in table 10. For small grains threshed with stationary threshers or cut and fed unthreshed it was assumed that 80 percent of the total straw produced, if cut at the ground level, was cut and recoverable.

Table 10.— Estimated production of straw per 1,000 bushels of grain harvested

Small-grain crop	: Total straw:		Straw cut if		: Straw recoverable if	
	: yield if	: Harvested:	: Combined:	: Harvested:	: Combined	
	: cut at	: with	: Windrow:	: as	: with	: Windrow:
	: ground	: binders	: combined:	: standing:	: binders	: combined:
	: level	: 1/	: grain	: 1/	: grain	: standing
	: Tons	: Tons	: Tons	: Tons	: Tons	: Tons
Wheat	: 70.0	56.0	49.0	42.0	56.0	34.3
Oats	: 26.0	20.8	18.2	15.6	20.8	12.7
Barley	: 35.4	24.8	22.0	18.8	24.8	15.4
Rye	: 87.5	70.0	61.3	52.5	70.0	42.9
Flax	: 84.0	67.2	58.8	50.4	67.2	41.2
Buckwheat:	40.0	32.0	28.0	24.0	32.0	19.6
Rice	: 33.8	27.0	23.7	20.3	27.0	16.6

1/ For the small acreage that was cut with headers, reapers, cradles, scythes, mowers, etc., it was estimated that the quantity of straw cut and recoverable was the same as when binders were used. These estimates are based largely on information obtained from specialists of the Bureau of Plant Industry.

With the windrow-combine method it was estimated that 70 percent of the total production of straw, if cut at ground level, was cut and only 49 percent was recoverable. For small-grain crops combined as standing grain it was estimated that 60 percent of the total straw was cut and 42 percent was recoverable.

Small-grain straw is an important crop residue. In tonnage it is the largest residue of any crop. The value of straw varies greatly in different parts of the country. In areas where there are many livestock and the animals are housed during the winter, straw has long been considered a valuable byproduct. In the Great Plains and Western small-grain areas, the production of straw is large in relation to needs and is usually of little value, so ordinarily only a little of it is stacked or stored. Straw is bulky, and the expense of baling and transportation usually prevents extensive movement from surplus to deficit areas, or to distant industrial plants.

For centuries straw has been important in some foreign countries. It has been used in brickmaking, as a roofing material, for fuel, for making wearing apparel, for producing many household items, as a substitute for twine, and for feeding and bedding livestock. Industrial utilization in foreign countries, especially as a substitute for pulpwood, has increased greatly of late. In the United States there has been a marked expansion in the use of processed straw, especially for making strawboard, cigarette papers, and high-quality writing paper. Considerable quantities of non-processed straw are used as material for packing and for use in highway construction.

Production of small-grain crops in 1945 was generally at a high level and straw production was correspondingly large. Total production of small-grain straw in 1945 was about 26 percent above average with an estimated production of about 134.5 million tons, compared with the 1935-44 average of about 106.5 million tons (table 11).

Of the total straw produced in 1945 it was estimated that about 43 percent was non-recoverable straw (including stubble, and short straw and chaff) remaining in fields where the grain is harvested with combines. Most of the non-recoverable straw is returned to the soil where it supplies humus and plant food. Of the total small-grain straw, it was estimated that about 57 percent or about 76 million tons was recoverable or could have been readily collected for farm use or for sale. Of the recoverable straw, it was estimated that about 9 million tons were baled, about 25 million tons were used or sold as loose straw, and about 42 million tons were left in the fields or otherwise not utilized. In the Northeastern States a high proportion of the recoverable straw was utilized, as was the case in the Lake States and Appalachian States. A higher proportion of the recoverable straw was baled in the Corn Belt States than in other State groups. In Oklahoma and Texas, in the Great Plains States, and in some Mountain and Pacific Coast States, only a little straw was baled and the utilization of recoverable straw was much below other areas.

Table 11.- Estimated production and utilization of small-grain straw 1/

State	Estimated yearly average : straw production : if cut at ground level :			Straw : production in : 1945 that was:		Percentage of : recoverable straw in : 1945 that was:		
	1935-39	1940-44	1945	Left in : field as : stubble, : and chaff : and short : straw from : combines 2/:	Recover- : able for : use on : farm or : for : sale : 3/	Used : on : farms or : sold as : baled : straw	Used : on : farms or : sold as : loose : straw	Left in : field : or : other- : wise : not : used
	1,000	1,000	1,000	1,000	1,000	Percent	Percent	Percent
	tons	tons	tons	tons	tons			
New England	185	172	134	36	98	4.1	77.5	18.4
New York	1,333	1,373	1,306	467	839	24.0	56.2	19.8
New Jersey	160	145	148	77	71	67.6	9.9	22.5
Pennsylvania	2,384	2,101	2,305	753	1,550	25.9	62.3	11.8
Delaware	112	113	127	56	71	25.4	49.3	25.3
Maryland	686	602	601	199	402	23.6	58.2	18.2
Northeast	4,880	4,600	4,621	1,590	3,031	25.3	59.0	15.7
Ohio	4,175	4,068	5,385	2,418	2,967	33.4	27.5	39.1
Indiana	3,204	3,013	4,071	1,907	2,164	34.6	21.5	43.9
Illinois	6,002	5,375	5,859	2,692	3,167	38.7	21.5	39.8
Iowa	6,514	5,317	5,613	1,932	3,701	35.5	49.1	15.4
Missouri	3,511	2,743	2,110	778	1,332	25.6	35.7	38.7
Corn Belt	23,407	20,245	23,038	9,797	13,331	34.7	31.9	33.4
Michigan	2,663	2,747	3,676	1,339	2,137	26.7	42.1	31.2
Wisconsin	3,121	3,333	4,305	1,087	3,218	9.8	81.9	8.3
Minnesota	8,481	8,378	9,416	2,548	6,868	11.4	64.0	24.6
Lake States	14,265	14,458	17,397	5,174	12,223	13.6	64.9	21.5
North Dakota	6,399	14,874	16,087	6,569	9,518	1.1	21.2	77.7
South Dakota	3,847	6,611	9,090	3,127	5,963	2.8	41.6	55.6
Nebraska	4,953	6,063	8,635	3,782	4,853	4.1	32.3	63.6
Kansas	9,731	13,627	15,377	8,586	6,791	1.8	4.6	93.6
Great Plains	24,930	41,175	49,189	22,064	27,125	2.2	23.5	74.3
West Virginia	224	169	184	39	145	13.1	74.5	12.4
Kentucky	527	564	497	172	325	29.5	31.4	39.1
Tennessee	446	543	581	197	384	21.1	38.3	40.6
Appalachian	1,197	1,276	1,262	408	854	22.9	41.8	35.3
Virginia	735	767	747	223	524	24.2	53.8	22.0
North Carolina	508	752	730	310	420	28.1	32.9	39.0
South Carolina	409	590	729	276	453	11.5	50.1	38.4
Georgia	336	457	648	247	401	7.7	50.1	42.2
Florida	3	6	23	9	14	14.3	42.9	42.8
Alabama	56	115	193	72	121	10.7	55.4	33.9
Southeast	2,127	2,687	3,070	1,137	1,933	17.7	47.7	34.6
Mississippi	67	282	418	192	226	12.4	25.7	61.9
Arkansas	477	622	693	190	503	4.6	18.9	76.5
Louisiana	724	803	873	264	609	4.3	55.0	40.7
Delta States	1,268	1,707	1,984	646	1,338	5.8	36.5	57.7
Oklahoma	4,418	5,019	5,890	3,088	2,802	2.0	12.4	85.6
Texas	3,352	4,560	5,241	2,666	2,575	2.8	14.5	82.7
Oklahoma-Texas	7,770	9,579	11,131	5,754	5,377	2.4	13.4	84.2
Montana	2,818	5,855	4,893	2,538	2,355	.5	21.0	78.5
Idaho	2,173	2,407	2,891	1,333	1,558	4.0	35.8	60.2
Wyoming	301	467	563	237	326	1.5	47.9	50.6
Colorado	1,343	2,359	3,565	1,615	1,950	3.8	40.7	55.5
New Mexico	186	266	244	124	120	1.7	25.0	73.3
Arizona	112	139	172	93	79	3.8	12.7	83.5
Utah	535	688	742	293	449	9.8	53.2	37.0
Nevada	44	68	66	36	30	3.3	23.3	73.4
Mountain	7,512	12,249	13,136	6,269	6,867	3.0	33.3	63.7
Washington	3,669	4,413	4,645	2,534	2,111	3.2	14.0	82.8
Oregon	1,739	2,037	2,044	1,123	921	5.3	14.8	79.9
California	2,799	2,838	3,001	1,706	1,295	7.0	4.7	88.3
Pacific	8,207	9,288	9,690	5,363	4,327	4.8	11.4	83.8
United States	95,543	117,463	134,518	58,112	76,406	11.6	33.5	54.9

1/ Includes wheat, oats, barley, rye, flaxseed, buckwheat, and rice.

2/ Includes straw left as stubble, and chaff and straw too short to recover by raking fields where grain was combined.

3/ Includes chaff from grain threshed with stationary threshers.

Wheat Straw

Wheat straw is the chief small-grain straw, amounting to about 78 million tons or 58 percent of the total straw produced in 1945. A higher proportion of the wheat crop was combine-harvested than was the case of any other small grain, and recoverable wheat straw was estimated at only 52 percent of the total recoverable straw for all small-grain crops. Production of wheat straw in 1945 was high, reflecting the large wheat crop, and was estimated at about 31 percent above the 1935-44 average (table 12). Of the total wheat straw only about 40 million tons, or about 51 percent, was estimated as recoverable. About 9 percent of the recoverable straw was used or sold as baled straw, 19 percent was used or sold as loose straw, and 72 percent was left in field or otherwise not utilized.

In most counties of the Northeast States, the Eastern Corn Belt, the Lake States, and in Virginia and West Virginia, a high proportion of the wheat straw is utilized, either for bedding, for feed on farms where grown or sold. But little wheat straw is used for these purposes in the important wheat producing counties of the Great Plains, Oklahoma-Texas, the Mountain States or the Pacific Coast States. For other information regarding county utilization of wheat straw see figure 4.

Baling of wheat straw was relatively more important in the Corn Belt where more than half of the straw used on farms or sold was baled. In the Northeastern States and the Appalachian States, baling of straw was above average. In most States west of the Mississippi River only a small proportion was baled. Trade sources indicate that about 700,000 tons of baled wheat straw is usually bought each year by the manufacturers of strawboard and the Corn Belt States account for about two-thirds of this amount. Definite figures are not available, but it is believed there has been a decided increase in recent years in the baling of wheat straw. The combine method is now important in practically all wheat areas, and when the crop is combine-harvested the windrow pick-up baler can generally be used satisfactorily for saving the straw. In Indiana about 60 percent of the wheat straw baled in 1945 was handled with windrow pick-up balers, according to reports from crop correspondents.

Oat Straw

Oat straw production was second to wheat straw in tonnage. In 1945 it amounted to 30 percent of total straw production and 35 percent of the recoverable straw from all small-grain crops. Oat straw production in 1945 was large reflecting the record oat crop, and was about 36 percent above the 1935-44 average (table 13).

Of the oat straw produced in 1945 about 40 million tons, or about two-thirds was recoverable. The remainder was left in fields in the form of stubble and short straw, and chaff from grain harvested by combines.

Table 12.- Estimated production and utilization of wheat straw

State	Estimated yearly average wheat-straw production if cut at ground level			Straw production in 1945 that was:		Percentage of recoverable straw in 1945 that was:		
	1935-39	1940-44	1945	Left in field as stubble, and chaff and short straw from combines 1/	Recoverable for use on farm or for sale 2/	Used on farms or sold as baled straw	Used on farms or sold as loose straw	Left in field or other wise not used
	tons	tons	tons	tons	tons	Percent	Percent	Percent
Maine	6	3	1	---	1	3/ 25.0	3/ 63.0	3/ 10.0
New York	483	500	640	244	396	32.0	46.0	22.0
New Jersey	92	83	93	49	44	71.0	9.0	20.0
Pennsylvania	1,452	1,170	1,403	1,067	336	30.0	60.0	10.0
Delaware	99	88	91	39	52	24.0	51.0	25.0
Maryland	286	175	474	158	316	23.0	49.0	27.0
Northeast	2,722	2,318	2,702	1,571	1,131	20.4	31.3	34.7
Ohio	3,348	2,321	2,624	1,315	2,209	27.0	27.0	35.0
Indiana	2,091	1,658	2,449	1,176	1,273	36.0	20.0	34.0
Illinois	2,869	1,786	2,737	881	1,856	23.0	32.0	50.0
Iowa	638	261	186	76	110	48.0	34.0	38.0
Missouri	2,342	1,320	1,278	307	771	42.0	32.0	14.0
Corn Belt	10,809	7,349	9,071	3,322	5,749	32.8	27.8	33.3
Michigan	1,260	1,187	1,890	636	1,060	31.0	23.0	32.0
Wisconsin	126	105	103	30	75	3/ 8.0	3/ 82.0	3/ 10.0
Minnesota	1,822	1,587	1,487	428	1,059	3.0	34.0	31.0
Lake States	3,208	2,879	3,480	1,286	2,194	1.7	35.7	35.6
North Dakota	3,884	9,897	10,820	4,609	6,211	1.0	35.0	34.0
South Dakota	1,282	2,483	3,476	1,394	2,082	2.5	27.0	70.5
Nebraska	3,131	3,333	5,765	2,877	2,888	3.5	13.5	83.0
Kansas	8,531	11,702	14,556	3,224	6,332	2.5	2.5	96.0
Great Plains	16,828	27,415	34,617	17,104	17,513	1.8	11.7	86.5
West Virginia	154	105	113	24	89	17.0	71.0	12.0
Kentucky	457	416	351	127	224	32.0	23.0	45.0
Tennessee	376	370	318	108	210	22.0	35.0	43.0
Appalachian	967	891	782	259	323	25.4	36.0	38.6
Virginia	586	567	532	164	368	26.0	50.0	24.0
North Carolina	397	509	400	185	215	34.0	16.0	50.0
South Carolina	124	220	208	100	108	10.0	10.0	80.0
Georgia	113	164	173	81	92	8.0	13.0	79.0
Alabama	4	10	22	11	11	12.0	21.0	67.0
Southeast	1,224	1,470	1,335	541	794	23.7	30.7	45.6
Mississippi	---	17	26	14	12	5.0	7.0	88.0
Arkansas	50	24	29	11	18	15.0	20.0	65.0
Delta States	50	41	35	25	30	11.0	14.8	74.2
Oklahoma	3,516	3,947	5,171	2,823	2,348	.3	6.5	93.0
Texas	1,906	2,975	3,371	1,864	1,507	.4	3.0	96.6
Oklahoma-Texas	5,422	6,922	8,542	4,687	3,855	.5	3.1	94.4
Montana	2,483	4,837	4,000	2,116	1,884	.5	17.0	82.5
Idaho	1,824	1,791	2,291	1,063	1,226	4.0	34.0	62.0
Wyoming	157	254	296	134	162	2.0	34.0	64.0
Colorado	896	1,612	2,483	1,165	1,318	4.0	35.0	61.0
New Mexico	161	207	194	104	90	1.0	19.0	80.0
Arizona	71	38	35	20	15	2.5	22.0	75.5
Utah	383	424	474	194	280	10.0	49.0	41.0
Nevada	29	34	34	12	15	3.0	17.0	80.0
Mountain	6,004	9,197	9,807	4,317	4,990	2.9	28.3	68.8
Washington	3,370	3,856	4,306	2,381	1,925	2.8	12.0	86.0
Oregon	1,325	1,444	1,527	850	677	2.3	13.7	83.0
California	1,175	730	749	431	318	10.0	3.0	87.0
Pacific	5,870	6,030	6,582	3,662	2,920	3.2	11.4	85.4
United States	53,104	65,613	77,576	37,793	39,783	8.9	19.2	71.9

1/ Includes straw left as stubble, and chaff and straw too short to recover by raking fields where grain was combined.

2/ Includes chaff from grain threshed with stationary threshers.

3/ No reports received from crop correspondents. Estimates based largely on reports supplied in adjacent or nearby States.

FOR HORIZONTAL PAGE USE ONLY

PERCENTAGE OF RECOVERABLE WHEAT STRAW USED ON FARMS OR SOLD, 1945

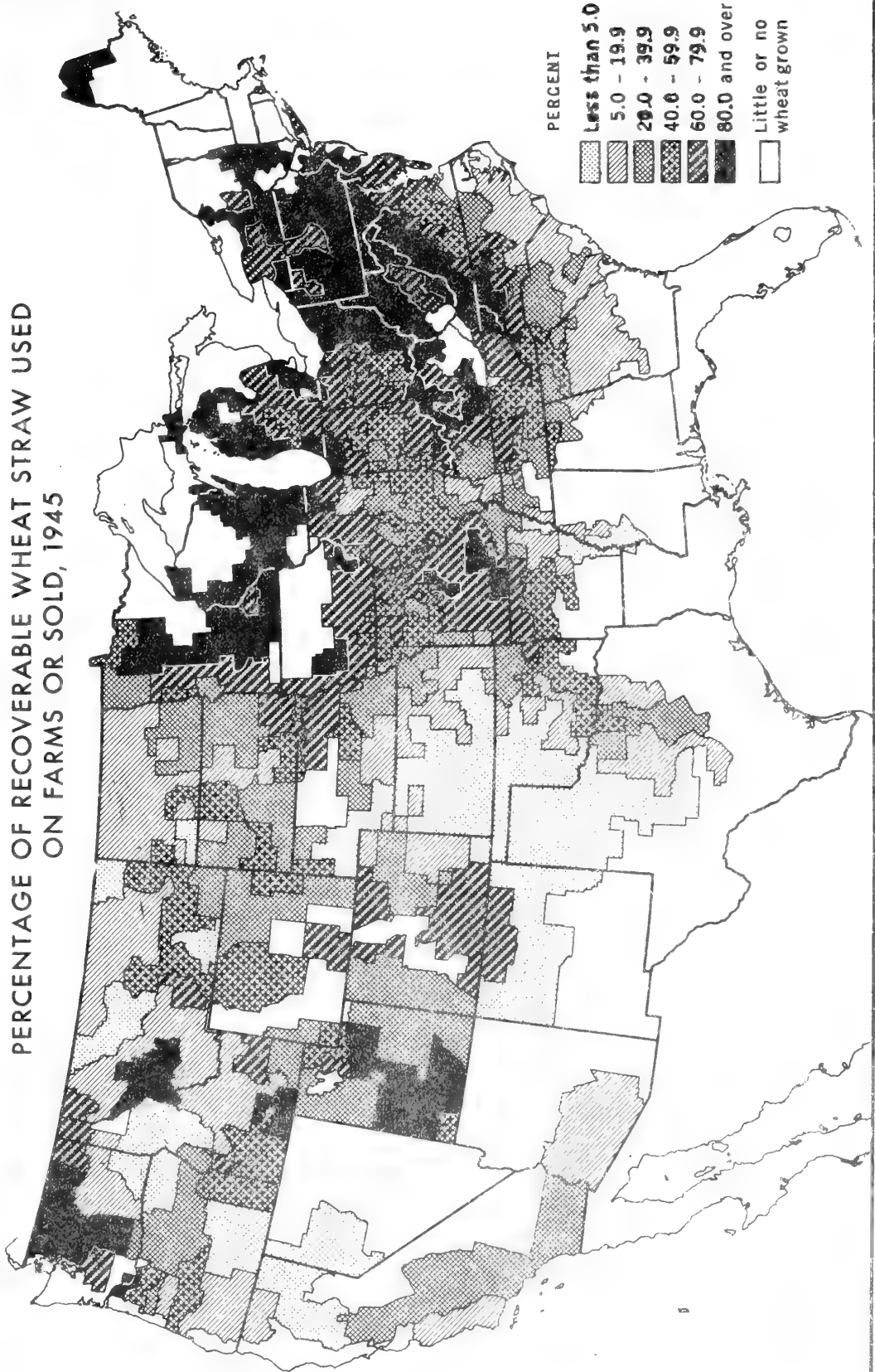


FIGURE 4

Table 13.- Estimated production and utilization of oat straw

State	Estimated yearly average oat-straw production if cut at ground level			Straw production in 1945 that was:		Percentage of recoverable straw in 1945 that was:		
	1935-39	1940-44	1945	Left in field as stubble, and chaff and short straw from combines 1/	Recover- able for use on farm or for sale 2/	Used on farm or sold as baled straw	Used on farm or sold as loose straw	Left in field or other- wise not used
	1,000 tons	1,000 tons	1,000 tons	1,000 tons	1,000 tons	Percent	Percent	Percent
New England	163	154	123	33	90	4.0	78.0	18.0
New York	399	647	500	158	342	16.0	70.0	14.0
New Jersey	36	33	28	14	14	61.0	20.0	19.0
Pennsylvania	562	647	639	201	438	19.0	69.0	12.0
Delaware	2	3	4	2	2	40.0	45.0	15.0
Maryland	27	27	29	8	21	13.0	70.0	17.0
Northeast	1,489	1,311	1,323	416	907	16.9	69.5	13.6
Ohio	1,021	1,112	1,285	368	715	23.0	29.0	48.0
Indiana	941	1,130	1,497	674	323	33.0	24.0	43.0
Illinois	3,092	3,399	4,032	1,770	2,263	43.0	25.0	32.0
Iowa	3,249	4,610	3,328	1,796	3,532	36.0	50.0	14.0
Missouri	1,031	1,266	746	239	507	32.0	40.0	28.0
Corn Belt	11,334	11,337	12,888	5,047	7,841	36.3	37.5	26.2
Michigan	1,070	1,262	1,365	620	945	23.0	47.0	30.0
Wisconsin	1,866	2,365	3,961	998	2,963	10.0	82.0	8.0
Minnesota	3,743	4,020	6,309	1,640	4,669	10.0	71.0	19.0
Lake States	6,631	7,347	11,835	3,258	8,577	11.4	72.2	16.4
North Dakota	791	1,676	2,242	751	1,491	1.0	45.0	54.0
South Dakota	1,044	1,880	3,728	1,081	2,647	2.0	56.0	42.0
Nebraska	1,019	1,321	1,998	581	1,417	6.0	66.0	28.0
Kansas	928	1,074	440	169	271	10.0	42.0	48.0
Great Plains	3,782	5,331	8,408	2,582	5,826	3.1	55.0	41.9
West Virginia	44	43	50	10	40	10.0	82.0	8.0
Kentucky	33	44	57	15	42	11.0	78.0	11.0
Tennessee	35	74	166	32	114	23.0	47.0	30.0
Appalachian	112	161	273	77	196	17.8	66.8	21.4
Virginia	51	79	103	26	77	18.0	72.0	10.0
North Carolina	139	174	268	98	170	21.0	56.0	23.0
South Carolina	271	344	492	164	328	12.0	65.0	23.0
Georgia	211	273	461	159	302	8.0	62.0	30.0
Florida	3	6	23	9	14	10.0	46.0	44.0
Alabama	52	103	170	61	109	11.0	59.0	30.0
Southeast	727	979	1,517	517	1,000	12.6	62.2	25.2
Mississippi	67	261	387	175	212	12.0	27.0	61.0
Arkansas	128	189	213	71	142	11.0	59.0	30.0
Louisiana	40	90	95	41	54	8.0	35.0	57.0
Delta States	235	540	695	287	408	11.1	39.2	49.7
Oklahoma	736	706	545	175	370	12.0	50.0	38.0
Texas	949	796	1,075	440	635	10.0	25.0	65.0
Oklahoma-Texas	1,685	1,502	1,620	615	1,005	10.7	34.2	55.1
Montana	183	411	244	92	152	1.0	58.0	41.0
Idaho	154	185	191	78	113	4.0	56.0	40.0
Wyoming	74	97	128	44	84	2.0	70.0	28.0
Colorado	113	143	200	60	140	5.0	71.0	24.0
New Mexico	15	23	25	9	16	5.0	46.0	49.0
Arizona	5	7	10	4	6	5.0	40.0	55.0
Utah	36	47	52	17	35	10.0	68.0	22.0
Nevada	3	7	9	5	4	10.0	50.0	40.0
Mountain	583	920	839	309	550	3.6	62.8	33.6
Washington	199	219	168	68	100	25.0	43.0	32.0
Oregon	233	256	209	105	104	20.0	24.0	56.0
California	109	129	133	71	62	19.0	20.0	61.0
Pacific	541	604	510	244	266	21.7	30.2	48.1
United States	27,179	31,552	39,928	13,352	26,576	17.1	55.1	27.8

1/ Includes all straw left as stubble, and chaff and straw too short to recover by raking fields where grain was combined.

2/ Includes chaff from grain threshed with stationary threshers.

Oat straw contains more leafy material than other small-grain straws. Most farmers prefer it for bedding and feed. It was estimated that about 72 percent of the 1945 recoverable oat straw was used on farms or sold. This is a higher percentage than for any other small-grain straw. According to reports from the crop correspondent about 17 percent of the recoverable oat straw was baled. Baling straw was especially important in the Corn Belt States where about a third of the oat crop in 1945 was grown. In Indiana, of the oat straw baled that year about 50 percent was done with windrow pick-up balers.

In all State groups a higher proportion of oat straw was used on farms or sold as loose straw than any other small-grain straw in 1945; with about 55 percent of the recoverable straw used as loose straw. In the Northeastern, Lake, Mountain, Appalachian and Southeastern States more than 60 percent of the recoverable oat straw was used or sold as loose straw. In Oklahoma-Texas, the Delta States, and the Pacific Coast States around 50 percent was left in fields or was not otherwise used.

Barley Straw

Barley straw is third in importance among small-grain straws, but in 1945 it was only about 7 percent of the total straw production. Production of barley straw in 1945 was estimated at about 8 percent below the 1935-44 average, reflecting a similar decline in barley for grain. Of the barley straw, approximately 57 percent was estimated to be recoverable (table 14). Only about 4 percent of the recoverable straw was used on farms or sold as baled straw but more than a third of it was used or sold as loose straw. Utilization of barley straw was above average in the Northeastern States, and the Southeastern States and in the Lake States where smooth awn varieties predominate. In the Pacific Coast States and in Oklahoma and Texas around 90 percent of the recoverable barley straw was left in fields or was otherwise not used. Use by strawboard manufacturers is limited, as they prefer wheat or rye straw.

Rye Straw

Production of rye straw in 1945 was about 55 percent of the 1935-44 average, reflecting the sharp decline in production of rye. Until recently, rye has been fourth in importance of the small-grain straws but with the increasing production of flaxseed, it was fifth in importance in 1945 amounting to less than 2 percent of the total straw. More than 60 percent of the indicated production of rye straw was estimated as recoverable, but more than half of this was left in fields or was otherwise not used. About 11 percent of the recoverable rye straw was used on farms or sold as baled straw and about 36 percent was used on farms or sold as loose straw (table 15). Baling was relatively important in the Corn Belt and the Northeastern States where total utilization of rye straw was above average. Utilization was below average in most States west of the Mississippi River. Rye straw has comparatively important nonfarm uses and is generally considered the equal of wheat straw in making strawboard.

Table 14.- Estimated production and utilization of barley straw

State	Estimated yearly average barley-straw production if cut at ground level			Straw production in 1945 that was:		Percentage of recoverable straw in 1945 that was:		
	1935-39	1940-44	1945	Left in field as stubble, and chaff and short straw from combines 1/	Recover- able for use on farm or for sale 2/	Used on farm or sold as baled straw	Used on farm or sold as loose straw	Left in field or other- wise not used
	1,000 tons	1,000 tons	1,000 tons	1,000 tons	1,000 tons	Percent	Percent	Percent
New England	10	9	5	2	3	3/ 9.0	3/ 61.0	3/ 30.0
New York	126	98	90	38	52	3/ 30.0	3/ 50.0	3/ 20.0
New Jersey	3	7	9	5	4	76.0	9.0	15.0
Pennsylvania	79	120	126	44	82	33.0	52.0	15.0
Delaware	2	8	10	5	5	35.0	40.0	25.0
Maryland	47	73	67	21	46	21.0	53.0	24.0
Northeast	267	315	307	115	192	29.9	51.1	19.0
Ohio	17	36	24	12	12	15.0	14.0	71.0
Indiana	19	60	37	17	20	21.0	17.0	62.0
Illinois	103	108	27	13	14	14.0	28.0	58.0
Iowa	424	178	3	1	2	3/ 25.0	3/ 35.0	3/ 40.0
Missouri	83	107	44	16	28	15.0	37.0	48.0
Corn Belt	646	489	135	59	76	16.7	26.4	56.9
Michigan	179	190	130	53	77	3/ 16.0	3/ 51.0	3/ 33.0
Wisconsin	788	503	128	33	95	8.0	83.0	9.0
Minnesota	1,758	1,327	459	132	327	3.0	56.0	41.0
Lake States	2,725	2,020	717	218	499	5.9	60.4	33.7
North Dakota	835	1,853	1,860	701	1,159	.6	28.4	71.0
South Dakota	858	1,339	1,127	374	753	1.3	43.7	55.0
Nebraska	451	1,027	475	180	295	1.3	44.7	54.0
Kansas	176	645	251	126	125	1.5	30.5	68.0
Great Plains	2,320	4,864	3,713	1,381	2,332	1.0	35.5	63.5
West Virginia	6	9	9	2	7	5.0	86.0	9.0
Kentucky	23	77	44	15	29	30.0	30.0	40.0
Tennessee	24	63	63	26	37	14.0	27.0	59.0
Appalachian	53	149	116	43	73	19.5	33.8	46.7
Virginia	47	69	65	19	46	22.0	61.0	17.0
North Carolina	8	30	31	15	16	26.0	22.0	52.0
South Carolina	3	7	16	7	9	11.0	19.0	70.0
Georgia	---	5	6	3	3	5.0	21.0	74.0
Alabama	---	2	1	---	1	15.0	8.0	77.0
Southeast	58	113	119	44	75	20.8	45.3	33.9
Mississippi	---	4	5	3	2	5.0	10.0	85.0
Arkansas	4	6	5	2	3	20.0	39.0	41.0
Delta States	4	10	10	5	5	14.0	27.4	58.6
Oklahoma	122	247	105	55	50	1.3	12.7	86.0
Texas	73	222	127	68	59	1.3	5.7	93.0
Oklahoma-Texas	195	469	232	123	109	1.3	8.9	89.8
Montana	99	396	523	264	259	.3	30.7	69.0
Idaho	183	420	402	187	215	3.5	36.0	60.5
Wyoming	58	98	132	56	76	.6	53.4	46.0
Colorado	307	523	798	350	448	3.0	49.0	48.0
New Mexico	8	24	22	10	12	1.0	43.0	56.0
Arizona	34	62	94	50	44	3.5	11.0	85.5
Utah	114	211	207	79	128	10.0	58.0	32.0
Nevada	12	27	23	12	11	10.0	15.0	75.0
Mountain	815	1,761	2,201	1,008	1,193	3.2	42.1	54.7
Washington	83	305	155	78	77	5.0	23.0	72.0
Oregon	138	287	268	148	120	4.5	10.0	85.5
California	1,143	1,275	1,473	847	626	4.0	1.0	95.0
Pacific	1,364	1,867	1,896	1,073	823	4.2	4.4	91.4
United States	8,447	12,057	9,446	4,069	5,377	4.2	34.5	61.3

1/ Includes all straw left as stubble, chaff and straw too short to recover by raking fields where grain was combined.

2/ Includes chaff from grain threshed with stationary threshers.

3/ No reports received from crop correspondents. Estimates based largely on reports supplied in adjacent or nearby States.

Table 15.- Estimated production and utilization of rye straw

State	: Estimated yearly average:			Straw		: Percentage of		
	: rye-straw production :			production in		: recoverable straw in		
	: if out at ground level :			1945 that was:		: 1945 that was: 1/		
				Left in	Recover-			Left in
				field as	able for:	Used :	Used :	field
				stubble,	use on :	on :	on :	or
	1935-39:	1940-44:	1945	and chaff	farm or	farm or:	farm or:	other-
				and short	for	sold as:	sold as:	wise
				straw from	sale	baled:	loose :	net
				combines 2/:	3/	straw:	straw :	used
	1,000	1,000	1,000	1,000	1,000	Percent	Percent	Percent
	tons	tons	tons	tons	tons			
New York	33	28	15	5	10	32.0	46.0	22.0
New Jersey	28	22	18	9	9	66.0	5.0	29.0
Pennsylvania	96	68	56	18	38	30.0	57.0	13.0
Delaware	8	14	22	10	12	29.0	42.0	29.0
Maryland	20	23	25	10	15	23.0	51.0	26.0
Northeast	185	155	136	52	84	32.7	46.9	20.4
Ohio	79	109	41	18	23	35.0	30.0	35.0
Indiana	145	142	77	36	41	37.0	20.0	43.0
Illinois	115	62	51	23	28	35.0	13.0	52.0
Iowa	174	27	13	5	8	30.0	35.0	35.0
Missouri	52	44	39	15	24	23.0	33.0	44.0
Corn Belt	565	384	221	97	124	33.0	23.8	43.2
Michigan	154	84	73	29	44	27.0	46.0	27.0
Wisconsin	299	139	95	23	72	5.0	81.0	14.0
Minnesota	632	261	150	38	112	9.0	63.0	28.0
Lake States	1,085	484	318	90	228	11.2	65.4	23.4
North Dakota	708	774	136	51	85	.8	6.4	92.8
South Dakota	609	651	368	132	236	2.0	29.0	69.0
Nebraska	351	378	395	143	252	3.0	44.0	53.0
Kansas	63	92	74	37	37	2.0	3.0	95.0
Great Plains	1,731	1,895	973	363	610	2.2	30.5	67.3
West Virginia	9	4	5	1	4	9.0	78.0	13.0
Kentucky	13	26	44	15	29	35.0	30.0	35.0
Tennessee	30	34	28	10	18	20.0	34.0	46.0
Appalachian	52	64	77	26	51	27.6	35.2	37.2
Virginia	45	47	43	13	30	24.0	43.0	33.0
North Carolina	42	36	29	12	17	31.0	22.0	47.0
South Carolina	11	19	13	5	8	11.0	11.0	78.0
Georgia	12	15	8	4	4	8.0	14.0	78.0
Southeast	110	117	93	34	59	23.2	30.6	46.2
Oklahoma	43	102	65	33	32	1.0	8.0	91.0
Texas	7	22	17	9	8	1.0	10.0	89.0
Oklahoma-Texas	50	124	82	42	40	1.0	8.4	90.6
Montana	39	44	16	8	8	1.0	24.0	75.0
Idaho	8	9	6	3	3	5.0	43.0	52.0
Wyoming	12	18	7	3	4	2.0	35.0	63.0
Colorado	27	81	84	40	44	3.0	30.0	67.0
New Mexico	2	12	3	1	2	1.0	34.0	65.0
Utah	2	6	9	3	6	7.0	59.0	34.0
Mountain	90	170	125	58	67	3.1	32.9	64.0
Washington	13	31	16	7	9	11.0	30.0	59.0
Oregon	40	47	40	20	20	5.0	28.0	67.0
California	9	11	15	9	6	5.0	6.0	89.0
Pacific	62	89	71	36	35	6.5	24.7	68.8
United States	3,930	3,482	2,096	798	1,298	10.8	36.5	52.7

1/ Reports relative to the utilization of recoverable straw were received from crop correspondents in Wisconsin, Minnesota, North Dakota, South Dakota, and Nebraska. Estimates in other areas based largely on utilization of straw of other small grains for which reports were received.

2/ Includes all straw left as stubble, and chaff and straw too short to recover by raking fields where grain was combined.

3/ Includes chaff from grain threshed with stationary threshers.

Flaxseed Straw

Along with the decided wartime increase in production of flaxseed there was a corresponding increase in flax straw. The estimated total production of flaxseed straw in 1945 was more than three times the 1935-39 average but was slightly below the 1940-44 average (table 16). Of the total flaxseed straw approximately 60 percent in 1945 was estimated as recoverable. Of this, somewhat more than 40 percent was used on farms or sold as baled or loose straw.

Flaxseed straw came into extensive use during the war in making cigarette paper and other high-quality paper. Trade sources indicate that around 360,000 tons were bought for industrial uses in 1945. Reports from crop correspondents' show that about 340,000 tons were sold or used as baled straw, but some loose straw is bought from farmers and baled before shipment. The baling of straw was mostly confined to Minnesota, South Dakota, Iowa, and California, where practically all of the flax straw for industrial uses was bought.

In all important flaxseed States except Minnesota most of the flaxseed straw was left in fields or was not otherwise used.

Table 16.- Estimated production and utilization of flaxseed straw 1/

State	Estimated yearly average of flax-straw production if : 1935-39 : 1940-44 : 1945			Straw production in 1945 that was: Left in field as stubble and chaff and short straw from combines 2/		Percentage of recoverable straw in 1945 that was: Recoverable : Used on farm or sold as baled straw : Used on farm or sold as loose straw : Left in field or otherwise wise not used		
	: 1,000 tons	: 1,000 tons	: 1,000 tons	: 1,000 tons	: 1,000 tons	Percent	Percent	Percent
Iowa	: 26	238	79	33	46	17	25	58
Minnesota	: 519	1,164	986	304	682	36	35	29
North Dakota	: 178	672	1,025	456	569	3	14	83
South Dakota	: 53	257	389	145	244	19	17	64
Kansas	: 33	114	56	30	26	1	7	92
Texas	: 3	17	42	24	18	-	2	98
Montana	: 14	167	110	58	52	-	9	91
Arizona	: 2	32	33	19	14	-	-	100
California	: 71	287	161	89	72	26	1	73
All other States	: 25	64	22	8	14	9	46	45
United States:	924	3,012	2,903	1,166	1,737	19.4	22.2	58.4

1/ Does not include flax for fiber.

2/ Includes all straw left as stubble, and chaff and straw too short to recover by raking fields in which grain was combined.

3/ Includes chaff from grain threshed with stationary threshers.

Buckwheat Straw

Production of buckwheat has been declining for many years and in 1945 the total of the buckwheat straw was estimated at 266,000 tons. About 68 percent of the total output of straw was estimated as recoverable (table 17). About 55 percent of this was utilized on farms or sold. Buckwheat is grown principally in hilly areas and less than 1 percent of the recoverable straw was used or sold as baled straw.

Table 17.- Estimated production and utilization of buckwheat straw

State	Estimated yearly average buckwheat- straw production if cut at ground level:			Straw production in 1945 that was:		Percentage of recoverable straw in 1945 that was: 1/		
	1935-39:	1940-44:	1945	Left in : field as stubble, chaff and short straw from combines	Recover- able for use on farm or for sale	Used on farm or sold baled	Used on farm or sold as loose straw	Left in field or other- wise not used
	: 1,000 : tons	: 1,000 : tons	: 1,000 : tons	: 1,000 : tons	: 1,000 : tons	Percent	Percent	Percent
New York	: 90	100	61	22	39	.8	50.0	49.2
Pennsylvania	: 95	96	81	25	56	.5	65.0	34.5
All other	:							
Northeast	:							
States	: 12	10	11	3	8	.3	74.5	25.2
Northeast	: 197	206	153	50	103	.6	60.0	39.4
Michigan	: 14	19	14	6	8	.2	25.0	74.8
Wisconsin	: 6	10	12	3	9	.2	65.0	34.8
Minnesota	: 7	19	25	6	19	.1	60.0	39.9
Lake States	: 27	48	51	15	36	.1	53.5	46.4
Corn Belt	: 25	21	36	14	22	.5	32.5	67.0
Great Plains	: 4	3	6	2	4	-	18.0	82.0
Appalachian	: 15	11	14	3	11	.3	64.0	35.7
Southeast	: 8	8	6	1	5	.2	60.0	39.8
United	:							
States	: 274	297	266	85	181	.4	54.7	44.9

1/ Reports received from crop correspondents in New York and Michigan.

Estimates in other areas based largely on harvest practices for other small grains for which reports were received.

2/ Includes all straw left as stubble, and chaff and straw too short to recover by raking fields where grain was combined.

3/ Includes chaff from grain threshed with stationary threshers.

Rice Straw

Estimated production of rice straw in 1945 was somewhat above average but amounted to less than 2 percent of the total small-grain straw. Of the 2.3 million tons of rice straw produced, it was estimated that more than 60 percent was recoverable. Of this about 56 percent was left in the fields or was not otherwise used. Baling rice straw is not done generally—about 2.4 percent of the recoverable straw was baled (table 18).

In the eastern rice areas after the rice is harvested, the fields are often pastured; cattle graze the stubble and have access to the straw stacks. In these States, 40 percent or more of the rice straw was used, or was sold as loose straw, principally for feeding cattle.

The reports indicate that practically all of the recoverable rice straw in California was left in the fields or was otherwise not utilized.

Table 18.— Estimated production and utilization of rice straw

State	Estimated yearly rice straw production if cut at ground level			Straw production in 1945 that was:		Percentage of recoverable straw in 1945 that was:		
	1935-39	1940-44	1945	Left in field as stubble, chaff and short straw from combines	Recover- able for use on farm or for sale 2/ 1/	Used on farm or sold as baled straw	Used on farm or sold as loose straw	Left in field or other- wise not used
	:1,000 : tons	1,000 : tons	1,000 : tons	1,000 : tons	1,000 : tons	Per- cent	Per- cent	Per- cent
Arkansas	: 295	403	446	106	340	1	47	52
Louisiana	: 684	713	778	223	555	4	57	39
Texas	: 414	528	609	261	348	2	35	63
California	: 292	406	470	259	211	1	2	97
United States	: 1,685	2,050	2,305	849	1,454	2.4	41.4	56.2

1/ Includes all straw left as stubble, and chaff and straw too short to recover by raking fields where grain was combined.

2/ Includes chaff from grain threshed with stationary threshers.

U. S. Department of Agriculture
Washington 25, D. C.

Penalty for private use to avoid
payment of postage \$300

OFFICIAL BUSINESS

BAE-FM 66- May 1947- 800
PERMIT NO. 1001